Editorial

Advances in Mechanical Engineering

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2015, Vol. 7(5) 1–2

DOI: 10.1177/1687814015586529
aime.sagepub.com
SAGE

Special issue on "Marine Energy Conversion"

The pursuit of new energy sources has recently led to acknowledge the discovery of an enormously copious source of energy in oceans. In recent years, marine energy has become the most promising form of renewable energy source. Marine energy is widespread and significantly available at any latitude. Its power density is the highest among renewable energy sources.

According to the Center for International Earth Science Information Network (CIESIN) at Columbia University, around 40% of the world's population lives within a 100 km (60 miles) distance from the coast. Therefore, harvesting energy from the sea facilitates the construction of the infrastructures for the energy transmission to the most densely populated areas on Earth.

Despite these advantages, the marine energy converters are called to operate in a very harsh environment, often with unpredictable wave amplitudes and frequencies or flow rates. Marine energy can be converted from different forms as tides, waves, marine current, temperature variation, and salinity.

Both the difficulty of harvesting and the variety of forms of this energy account for the absence of a standardized method for extraction and conversion. This lack, far from being an embarrassing stop to marine energy harvesting technologies, has triggered an extremely vital research effort in which many high-level both academic and industrial research teams are involved.

In fact, the vitality of this sector, which is testified by the present Special Issue also, has convinced SAGE, that the Guest Editors wish to thank, to make an annual Special Issue out of this subject.

This Special Issue comes as a collection of few selected articles that explore different technical aspects of marine energy conversion, including advances in new wave energy harvesting devices, turbine performance analysis, and conditioning of waves and numerical methods.

Marine energy conversion is in fact a multidisciplinary topic, including expertise in sectors ranging from mechanical engineering to electrical engineering. The submitted papers help to build a global overview of advances on the proposed topic.

In this Special Issue, in particular:

J Shi et al. present the advances in the design and experimental research of a new type wave energy power generation device. Based on the theory of linear stochastic waves, phase modulation (PM) frequency spectrum, and three-dimensional (3D) floating body wave load method, the papers analyze hydrodynamics using the SESAM software. Moreover, wave energy estimation and efficiency calculation of wave power device are carried out.

L Zhen et al. study the effect of solidity ratio on the impulse turbine installed on an oscillating water column (OWC) wave energy converter, verifying a numerical model established in FLUENT 14.5 with pre-existing experimental data and subsequently explore the effects of the solidity ratio on turbine performance.

KW Jun et al. introduce a solution to reduce the incident wave energy before it reaches the corner of the breakwater by utilizing the dredged region (trench region). The study involves investigating the interaction between the trench and the structure and simulating the reduction effect of the wave energy through the trench.

SJ Ha et al. propose in their paper a 20-kW ocean thermal energy converter (OTEC) equipped with a vapor–vapor ejector. Performance analysis was conducted to optimize the system, using the HYSYS program. This study evaluated an idea of dividing mass flow at a separator outlet and adding a vapor–vapor ejector at the condenser inlet to improve system efficiency of an OTEC power cycle. The process flow of the proposed system was analyzed to optimize system efficiency.

J Zhang et al. introduce a new finite element analysis method based on double boundaries interpolation

multiple reference frame (IMRF) for a constant-frequency double-rotor (CFDR) generator to be used in marine energy conversions. The proposed method is compared with the traditional methods showing its advantages and feasibility.

Finally, we hope that the readers will find in these articles a useful support for their research projects and a motivating incentive for further investigations. We would like to express our gratitude to all the contributing authors for sharing their research work through this Special Issue and to all the reviewers for their serious effort, which improved the quality of this Special Issue. It has been both a pleasure and an interesting experience for us to work on this Special Issue.

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